

CLAIMS

1. A method of embossing a cured silicone resin thermoset substrate to imprint patterns onto the substrate from a master mold comprising:

- (i) stacking a master mold with a cured silicone resin thermoset substrate such that the surface of the master mold containing a feature is facing the silicone resin substrate;
- (ii) applying pressure to the product of (i) in a press at a temperature slightly higher than the Tg of the silicone resin but lower than the softening point of the master mold;
- (iii) cooling the product of (ii) and maintaining the pressure on the mold; and
- (iv) releasing the substrate whereby the feature is imprinted on the silicone resin substrate.

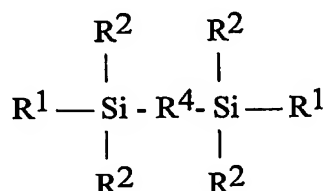
2. A method according to Claim 1, wherein the substrate is in the form of a film, plaque, or coating.

3. A method according to Claims 1 or 2, wherein the toughened silicone resin thermoset substrates have a glass transition temperatures from 50 °C to 120°C.

4. A method according to Claims 1, 2, or 3 wherein the pressure is at or above 1 metric ton.

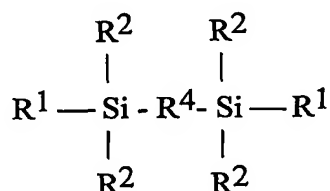
5. A method according to Claims 1, 2, 3, or 4, wherein the master mold is selected from silicon wafers, silicon carbide, silicon nitride, aluminum, stainless steel, nickel, alloys, and metal oxides.

6. A method according to Claims 1, 2, 3, 4, or 5 wherein the cured silicone resin thermoset substrate is a composition obtained by a method comprising (1) copolymerizing a combination comprising components (A) and (B) wherein component (A) is a hydrolyzate of a hydrolysis precursor wherein the hydrolysis precursor comprises (i) organotrialkoxysilanes or organotrihalosilanes and (ii) a monofunctional silane selected from triorganomonoalkoxysilanes, triorganomonohalosilanes, disiloxanes, and disilazanes and component (B) is a silyl-terminated hydrocarbon having the formula:



wherein each R^1 is independently selected from a halogen atom, a hydroxyl group, an alkoxy group, an oximo group, an alkyloximo group, an aryloximo group, an alkylcarboxyl group, and an arylcarboxyl group, each R^2 is independently selected from alkyl and aryl groups, and R^4 is a divalent hydrocarbon group.

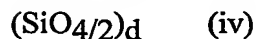
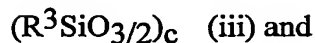
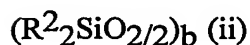
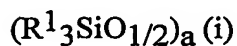
7. A method according to Claims 1, 2, 3, 4, or 5 wherein the cured silicone resin thermoset substrate is a composition comprising: (A') a silsesquioxane copolymer comprising units that have the empirical formula $R^1_a R^2_b R^3_c SiO_{(4-a-b-c)/2}$, wherein a is zero or a positive number, b is zero or a positive number, c is zero or a positive number, with the provisos that $0.8 \leq (a + b + c) \leq 3.0$ and component (A') has an average of at least two R^1 groups per molecule, each R^1 is a functional group independently selected from the group consisting of hydrogen atoms and monovalent hydrocarbon groups having aliphatic unsaturation, each R^2 is a monovalent hydrocarbon group selected from nonfunctional groups and R^1 , each R^3 is a monovalent hydrocarbon group selected from nonfunctional groups and R^1 ; (B') a silyl-terminated hydrocarbon having the general formula



where R^1 and R^2 are as described above for component (A'), with the provisos that when R^1 in component (A') is a hydrogen atom, R^1 in component (B') is an unsaturated monovalent hydrocarbon group and when R^1 in component (A') is an unsaturated monovalent hydrocarbon group, R^1 in component (B') is a hydrogen atom, and R^4 is a divalent hydrocarbon group; and (C') a hydrosilylation reaction catalyst.

8. A method according to Claims 1, 2, 3, 4, or 5 wherein the cured silicone resin thermoset substrate is a polysiloxane film comprising a silicone resin obtained by a method comprising reacting (A'') a silicone resin represented by the average formula $R^1_aSiO_{(4-a)/2}$ wherein R^1 is independently a monovalent hydrocarbon radical having from 1 to 10 carbon atoms, and a is integer of from 0 to 2 (both exclusive)) and having at least two unsaturated aliphatic hydrocarbon radicals in its molecule, (B'') an organosilicon compound having at least two silicon-bonded hydrogen atoms in its molecule, in the presence of (C'') a platinum catalyst.

9. A method according to Claim 8, wherein Component (A'') is a silicone resin comprising units



wherein R^1 and R^2 are each independently selected from monovalent hydrocarbon radicals having from 1 to 10 carbon atoms and unsaturated aliphatic hydrocarbon radicals, R^3 is an alkyl group having from 1 to 8 carbon atoms or an aryl group, a has a value of zero or greater than zero, b has a value of zero or greater than zero, c has a value of zero or greater than zero, d has a value of zero or greater than zero, with the provisos that the value of $c + d$ is greater than zero, the value of $a + b + c + d = 1$, and that are at least two silicon-bonded unsaturated aliphatic hydrocarbon atoms present in the silicone resin.

10. A method according to Claims 8 or 9 wherein Component (B'') is p-bis(dimethylsilyl) benzene.